
Essential elements of obstetric care at first referral level



**World Health Organization
Geneva**



00000

The World Health Organization is a specialized agency of the United Nations with primary responsibility for international health matters and public health. Through this organization, which was created in 1948, the health professions of some 165 countries exchange their knowledge and experience with the aim of making possible the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life.

By means of direct technical cooperation with its Member States, and by stimulating such cooperation among them, WHO promotes the development of comprehensive health services, the prevention and control of diseases, the improvement of environmental conditions, the development of health manpower, the coordination and development of biomedical and health services research, and the planning and implementation of health programmes.

These broad fields of endeavour encompass a wide variety of activities, such as developing systems of primary health care that reach the whole population of Member countries; promoting the health of mothers and children; combating malnutrition; controlling malaria and other communicable diseases, including tuberculosis and leprosy; having achieved the eradication of smallpox, promoting mass immunization against a number of other preventable diseases; improving mental health; providing safe water supplies; and training health personnel of all categories.

Progress towards better health throughout the world also demands international cooperation in such matters as establishing international standards for biological substances, pesticides, and pharmaceuticals; formulating environmental health criteria; recommending international nonproprietary names for drugs; administering the International Health Regulations; revising the International Classification of Diseases, Injuries, and Causes of Death; and collecting and disseminating health statistical information.

Further information on many aspects of WHO's work is presented in the Organization's publications.

Community Health Cell

Library and Information Centre

367, "Srinivasa Nilaya"

Jakkasandra 1st Main,

1st Block, Koramangala,

BANGALORE - 560 034.

Phone : 553 15 18 / 552 53 72

e-mail : chc@sochara.org

Essential elements of obstetric care at first referral level



World Health Organization
Geneva 1991

WHO Library Cataloguing in Publication Data

Essential elements of obstetric care at first referral level.

1. Maternal health services 2. Maternal-child health centers—organization & administration 3. Obstetrics 4. Developing countries

ISBN 92 4 154424 4

(NLM Classification: WA 310)

© WORLD HEALTH ORGANIZATION 1991

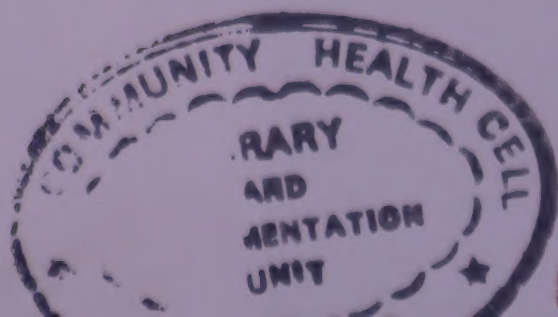
Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

TYPESET IN INDIA
PRINTED IN ENGLAND

89/8308-Macmillan/Clays-5500



MP-100
03508 N911

Contents

Preface	v
1. Introduction	1
Maternal mortality and morbidity in developing countries	1
Maternity care in district health systems	4
2. Essential elements of obstetric care related to causes of maternal death	8
Surgical obstetrics	9
Anaesthesia	18
Medical treatment	19
Blood replacement	23
Manual procedures and monitoring labour	26
Management of women at high risk	31
Family planning support	32
Neonatal special care	36
3. Implementation	37
Health personnel	37
Facilities	39
Equipment, supplies and drugs	42
Supervision	43
Evaluation	43
Research	43
Cost and financial considerations	44
References	46
Annex 1. Technical Working Group on Essential Obstetric Functions at First Referral Level	48
Annex 2. Surgical and delivery equipment	49
Annex 3. Materials for side-ward laboratory tests and blood transfusion	58
Annex 4. Essential drugs for obstetric services	61
Annex 5. Maternity centre facilities and equipment	64

Preface

Maternal mortality accounts for a large proportion of the deaths occurring among women of childbearing age in most of the developing world. Each year, about half a million women die from causes related to pregnancy and childbirth, and 99% of these deaths occur in developing countries. International concern over this appalling situation has greatly increased in recent years and has been emphasized in the conclusions and recommendations of both the International Conference on Population in 1984 and the World Conference to Review and Appraise the Achievements of the UN Decade for Women in 1985. A major international meeting, the Safe Motherhood Conference, held in Nairobi in 1987, was devoted to the subject.

The World Health Organization has recently intensified its efforts to improve maternal health care, focusing specifically on the reduction of maternal mortality. With the support of the United Nations Population Fund, WHO has initiated a worldwide programme on the collection, analysis and dissemination of information on maternal mortality and on the improvement and extension of coverage of maternal health care.

As part of this programme, a WHO Interregional Meeting on Prevention of Maternal Mortality was held in Geneva in 1985. Experts from many parts of the developing world reviewed the results of more than 20 studies on maternal mortality from all regions of the world. They then considered the medical, health service, reproductive and socioeconomic factors responsible for the very high maternal death rates in developing countries and outlined a series of actions needed,¹ concluding that a reduction of maternal mortality and morbidity required the following:

- improved living standards, through general socioeconomic development;
- trained supervision of pregnancy and labour at the primary health care level, and recognition and referral of women at high risk;

¹ *Prevention of maternal mortality: report of a WHO Interregional Meeting, Geneva, 1985.* Geneva, World Health Organization, 1986 (unpublished document FHE/86.1; available on request from the Division of Family Health, World Health Organization, Geneva, Switzerland).

- better access to referral facilities for the management of complications of pregnancy and childbirth; and
- universal availability of appropriate family planning methods.

Improvement in the quality and coverage of primary health care will do much to reduce the risks of childbearing, but the major complications of pregnancy, labour and the puerperium require skills and facilities which should be made available at the first referral level—the district or subdistrict hospital or a suitably staffed and equipped health centre—as well as at the secondary referral level of care. Many maternal deaths occur at first referral level, either because women come from too far and arrive too late, or because the essential obstetric care they urgently need is not available.

In 1986, WHO convened a Technical Working Group (Annex 1) to define the essential obstetric care necessary at first referral level for the reduction of maternal mortality and morbidity, and to describe the staff, training, supervision, facilities, equipment and supplies needed (Annexes 2–5). Dr. R. Cook (formerly Division of Family Health, WHO, Geneva) was Secretary to the group and subsequently arranged for its report¹ to be reviewed by some 50 experts in maternal health from many parts of the world. The present publication is based on this report, revised to take account of the comments received. It has been prepared by Dr M. Fathalla (Special Programme of Research, Development and Research Training in Human Reproduction, WHO, Geneva), Dr K. A. Harrison (University of Port Harcourt, Nigeria) and Dr B. E. Kwast (Maternal and Child Health, WHO, Geneva), with the collaboration of Dr G. Stott (formerly WHO, Geneva).

The book is intended for those responsible at district, provincial, regional, national and international levels for the planning, financing, organization and management of maternity care services, in particular in developing countries. The guidelines provided should not only make it possible to raise the standards of referral services at the district level to those required, but also help decision-makers to determine how far and by what means it may be possible to extend some of these services to more peripheral levels. This may

¹ *Essential obstetric functions at first referral level: report of a WHO Technical Working Group, Geneva, 1986.* Geneva, World Health Organization, 1986 (unpublished document FHE/86.4; available on request from the Division of Family Health, World Health Organization, Geneva, Switzerland).

involve upgrading both staff and facilities, where feasible and affordable, or may only require the extension of the skills of certain categories of health personnel, together with quite a modest addition of equipment and supplies and redeployment of space.

The severe economic constraints faced by many countries have been a major consideration in the preparation of this publication. Every effort, therefore, has been made to include only those requirements considered indispensable in assisting health authorities to reduce maternal mortality and morbidity by bringing competent obstetric care within the reach of all who need it. For certain procedures and techniques that are not at present in widespread use at first referral level in developing countries, points of technical relevance have been included in the text.

The World Health Organization acknowledges with gratitude the financial contribution of the United Nations Population Fund, which since 1984 has supported the WHO interregional project on the prevention of maternal mortality. It is as part of this project that this publication has been prepared.

I

Introduction

Maternal mortality and morbidity in developing countries

Maternal mortality rates in developing countries average about 450 per 100 000 live births, compared with an estimated 30 per 100 000 in developed countries (1). Rates vary widely between regions, between countries within a given region, and between urban and rural areas. In some countries, national rates exceed 1000 per 100 000 live births, with urban rates of 500 or more and rural rates several times as high. There are more maternal deaths in India in one day than there are in all the industrialized countries in a month. In areas where the problem is greatest, most maternal deaths go unregistered. The prevention of such deaths is considered in detail in a recent WHO publication (2).

Living conditions and the pattern of childbearing in most areas of developing countries lead to high rates of maternal morbidity. People prefer large to small families and, for most women, childbearing starts too soon, occurs too frequently, and does not cease until the age of 40 years or even later. Given this situation, the chances of something going wrong are considerable. In addition, for large sections of the population of the developing world, there is a general background of poverty, malnutrition, inadequate sanitation and water supply, illiteracy, and sociocultural problems relating to the status of women.

In many countries, maternal morbidity is particularly high in rural areas. In some respects, however, the quality of life in urban slums and periurban squatter settlements is worse than that in rural areas, partly because of poor hygiene and sanitation and overcrowding. As fuel and transport costs are often higher in urban areas, there is less money available for food, which itself tends to be more expensive than in rural areas; consequently, urban dwellers may eat less well and suffer more from undernutrition and malnutrition. For maternal health care, urban dwellers have certain advantages in that clinics and hospitals are often more readily available. However, the services are not always accessible; for

example, charges may be levied that are difficult for disadvantaged urban dwellers to afford.

A feature of the health care services in developing countries is the inequality in their distribution. In India, four-fifths of the population, but only one-fifth of the physicians, are in rural areas. The position is even worse in some African countries where health care coverage is largely restricted to cities, even though they support only 10–20% of the population. In many rural areas, there may be no health services at all or lack of roads and difficulties of transportation may make them inaccessible. A high proportion of maternal deaths in these areas occur at home, without trained assistance at delivery, or when the woman is actually on the way to a district hospital.

Anaemia, haemorrhage, eclampsia, infections, abortions and the complications of obstructed labour account for over 80% of maternal deaths in most developing countries. But these deaths represent only a small proportion of the total morbidity attributable to the same causes. For every maternal death, there are many more women in whom, after childbirth, disabilities develop that impair their general health and reproductive functions, with a possible reduction in their economic activity.

Most of these causes of maternal mortality and morbidity are preventable through properly organized primary health care and appropriate and accessible referral facilities. The following examples illustrate the need for care at different levels of the district health system.

Anaemia

In terms of its social and economic consequences, anaemia is the most important cause of morbidity in non-pregnant women of childbearing age in developing countries. Women in this period of life have a precarious iron balance due to loss of iron during menstruation. Where dietary intake of iron is low or its absorption is impaired, and where hookworm infection is prevalent, iron deficiency anaemia may be widespread and often severe, and is aggravated by pregnancy, delivery and lactation. In malarial areas, anaemia is often due to the combined effects of destruction of red blood cells and folic acid deficiency. Commonly, both types

of anaemia are present in the same population. The control of anaemia at community level can be effective in greatly reducing maternal mortality and morbidity (3). In addition, the life-threatening consequences of anaemia can be mitigated by appropriate medical treatment, blood replacement and, in some cases, timely surgical intervention at first referral level.

Pelvic sepsis

Pelvic sepsis may follow non-operative deliveries conducted under unhygienic conditions, abortions and operative deliveries. Properly treated, the infection often resolves. Untreated, as is so frequently the case after unattended births in developing countries, the infection leads to chronic pelvic inflammatory disease, which is the underlying cause of many of the cases of infertility, menstrual disorders and ectopic pregnancies so commonly seen in these countries. Infertility is particularly tragic because, in some societies, much stigma is attached to it; the affected woman loses her social standing and may even be divorced. As a result of pelvic inflammatory disease, numerous adhesions form in the peritoneal cavity. In some countries, virtually all women requiring abdominal operations have intra-peritoneal adhesions, which add to the risk of surgery and increase demands on health services in terms of postoperative care and prolonged convalescence. Pelvic sepsis may be largely avoided if trained personnel are available to conduct deliveries, supervise the puerperium and give antibiotic treatment if signs of infection appear.

Obstetric fistulae

The commonest cause of vesicovaginal fistula is neglected obstructed labour; scarce or underused health services, lack of accessible referral facilities and certain traditional attitudes to childbirth and the status of women provide the perfect setting for this injury. In communities where such conditions prevail, those at greatest risk are young teenage girls, who have not finished growing when they first become pregnant, and women with little or no formal education or who are illiterate, who often do not, or cannot, avail themselves of maternity care facilities. Women with vesicovaginal fistula become totally incontinent of urine and may also suffer from vaginal stenosis, amenorrhoea,

infertility and nerve palsy. Those with rectovaginal fistula also suffer from incontinence of faeces. The severity of the damage done to the birth canal and the ensuing psychological upset make life a misery, sometimes to the extent that, even after surgical repair, affected women never recover their self-esteem. The scale of this problem in some parts of Africa and Asia may be greater than is generally realized. The tragic effects of prolonged obstructed labour need never occur if the progress of labour is properly monitored and if suitable referral facilities are available.

Maternity care in district health systems

Planning and action to improve the coverage and quality of health care in developing countries are generally focused on district health systems. The district, or its equivalent, is the most peripheral unit of government that is self-contained and includes all elements of the national administration. Usually covering a population of between 100 000 and 200 000, the district health system comprises a district hospital (first referral level), a district health office, a district health centre, with dependent subcentres, dispensaries and health posts, and the community itself with its various types of health worker. Each of these must be involved in any programme to reduce maternal mortality and morbidity.

Maternal care at community level

At family and community level, maternal care includes prenatal examination, screening for those at high risk, treating such conditions as anaemia before they become so serious as to threaten safe childbirth, immunization against tetanus, early detection of abnormal pregnancy and labour, health education, instruction on infant care and feeding, family planning counselling, and delivery at home by trained attendants for women who desire it and are not at high risk.

In recent years, much effort has gone into training traditional or village birth attendants and into the use of trained midwives in the community, but there are still many areas where trained personnel are not available and women deliver unaided or are attended only by close relatives. In the absence of professional

care, serious complications may go unrecognized, often until it is too late. Consequences of inadequate maternal care include anaemia, eclampsia, obstructed labour, uterine rupture, obstetric fistulae, postpartum haemorrhage, puerperal infection and unwanted pregnancy. Attempts to terminate unwanted pregnancies through unsafe induced abortion constitute a major health hazard in urban areas in most developing countries.

Inaccessibility of referral facilities

In developing countries, most of the population of rural areas has no proper access to any sort of obstetric care, with the result that when complications develop during pregnancy, labour and the puerperium, affected women report very late for treatment. This carries serious consequences: not only are death rates high, but so is the proportion of women who die before treatment has had time to take effect. Many hospital studies of maternal mortality show that 10% or more of these deaths occur within the first hour of arrival, and another 30–50% within 24 hours. Diagnosis is also affected: at the time of death, two or more pregnancy complications, both of equal severity, may be present, making it difficult to decide which is the principal cause of death. Religious and cultural beliefs may not permit autopsies, even where facilities are available, and so the causes of maternal deaths are often diagnosed on clinical grounds only.

Even where trained birth attendants and midwives are working in the community giving prenatal, delivery and postnatal care, women continue to develop, and die from, major complications of pregnancy, labour and the puerperium. The skills and facilities needed to save these women's lives are not available at community level and, in many parts of the world, access to a hospital is very difficult because of lack of roads or transport or is restricted for want of money.

Reducing maternal mortality and improving obstetric care at first referral level

Consideration of the circumstances surrounding maternal deaths in the developing world leads to the conclusion that far-reaching changes are needed in district health systems so that well organized

maternal care services with the following characteristics can be developed:

- Total population coverage, which means that every pregnant woman should receive essential prenatal care from trained personnel.
- Provision for every woman to be cared for by a trained birth attendant during labour.
- Provision for all women at high risk during pregnancy to be cared for by trained health personnel at a suitable facility.
- Accessible facilities that are equipped and staffed to tackle complications arising during pregnancy, labour and delivery, especially those most commonly associated with maternal deaths.
- Readily available transport to link all levels of maternal health care, especially in emergencies.
- Provision of family planning services as part of all maternal and child health programmes.
- Keeping of records in a form that permits periodic assessment of performance and appropriate action to improve efficiency and effectiveness.
- Registration of births and of maternal and perinatal deaths so that the situation may be kept under regular review and needs and priorities identified.

In addition, it is important that the maternity service should function in such a way that people have confidence in it as well as in the system of health care it represents.

Improvements in the coverage and quality of maternal care at district level are desperately needed and are achievable and affordable, in spite of the economic constraints faced by many nations. What counts is not so much the prosperity within the country but how available resources, including health services, are distributed. In Malaysia, the provision of basic maternity services, where they did not exist before or where they existed but were poorly organized, reduced maternal mortality rates from 320 in 1957 to 107 per 100 000 live births in 1972. The results of progress in maternal health care in China have been even more dramatic, the maternal mortality rate dropping from 1500 before 1949 to about 50 per 100 000 births in 1982. In Cuba, where maternal and child health care has been one of the priorities since the National Health Service was started in 1961, the maternal mortality rate fell from 118 in 1962 to 31 per 100 000 births in 1984.

The first referral level—the district or subdistrict hospital or health centre to which a woman at high risk is referred prenatally or sent for emergency obstetric care—holds a key place in the organization of maternal care. Certain essential obstetric procedures, most of them life-saving in emergencies, can only be performed at this level, and it is for want of suitably trained staff, facilities and equipment to carry them out that many maternal deaths occur. It is often difficult enough for many women with complications of pregnancy, labour and the puerperium even to reach the first referral level; it is a tragedy if, on arrival at the hospital or health centre, they find that the specialized care they need is not available.

2

Essential elements of obstetric care related to causes of maternal death

The elements of obstetric care that are essential at first referral level to reduce maternal mortality and morbidity are shown in Table 1. They can be classified into the following categories:

1. Surgical obstetrics
2. Anaesthesia
3. Medical treatment
4. Blood replacement
5. Manual procedures and monitoring labour
6. Management of women at high risk
7. Family planning support.
8. Neonatal special care

Neonatal special care, while clearly not directly concerned with the reduction of maternal mortality, has been included because it is difficult to imagine maternal care facilities at first referral level that do not provide some special care for neonates, many of whom may be in less than optimal condition for the same reasons that put their mothers at risk. Thus the requirements for such care need to be included for practical planning purposes.

The order in which the categories are presented is not indicative of their ranking in importance. For each, the procedures and facilities considered essential for obstetric care are identified in the following sections, as related to the prevention or management of the major causes of maternal death, almost all of which are interrelated. All the requirements need not be met at the same time; priorities for action can be set by health planners according to the ranking of the main causes of maternal death prevailing in each

country, so that maternal health care at first referral level is gradually improved. Two principles should guide the implementation of any changes:

- services should be organized so that women with potentially fatal obstetric complications can obtain proper treatment without having to travel long distances; and
- there should be no economic barrier that prevents poor people from receiving maternal care at any level.

In planning the improvement or expansion of obstetric services, it is necessary to take into account certain aspects of management and the specific skills of health staff, the facilities, special equipment, and essential drugs and supplies required (Table 2). Requirements for accommodation, equipment, instruments, drugs and supplies are listed in Annexes 2 to 5. Practical details of surgical procedures are given in *Surgery at the district hospital: obstetrics, gynaecology, orthopaedics, and traumatology* (4).

Surgical obstetrics

Caesarean section

Caesarean section is significant in reducing the high maternal mortality rate in developing countries, since complications necessitating caesarean section (e.g. obstructed labour, antepartum haemorrhage and severe pregnancy-induced hypertension) are among the commonest causes of maternal death. If caesarean section is performed in emergencies where such complications have been neglected, there is a much higher mortality than if it is performed in less urgent circumstances. The risk of uterine scar rupture in subsequent pregnancies and deliveries stresses the need for women who have had caesarean sections to return for future deliveries to the care of a well equipped maternity unit.

Caesarean section is a major operation and should be performed only by persons who have been adequately trained. The categories of health worker to be trained should be decided by the health authorities and professional bodies of each country. The decision should be based on the availability of different kinds of health personnel, the number of caesarean sections required annually to maintain surgical skills, the availability of transport for referral, and properly conducted and evaluated health systems research.

Table 1. Essential elements of obstetric care related to the major causes of maternal mortality^a

Essential elements of obstetric care at first referral level	Major causes of maternal mortality							
	Obstructed labour	Ruptured uterus	Antepartum haemorrhage	Postpartum haemorrhage and retained placenta	Abortion	Hypertensive disorders of pregnancy and eclampsia	Puerperal or post-abortion sepsis	Ectopic pregnancy
								Severe anaemia
Surgical obstetrics								
Caesarean section	•	•	•			•		•
Surgical treatment of sepsis	•	•		•	•		•	
Repair of high vaginal and cervical tears				•			•	•
Laparotomy for repair of uterine rupture/hysterectomy		•		•				
Removal of ectopic pregnancy presenting as "acute abdomen"								•
Evacuation of uterus in abortion					•		•	
Intravenous oxytocin infusion to augment labour			•					
Amniotomy with/without oxytocin infusion			•			•		
Anaesthesia	•	•	•	•	•	•		•

Medical treatment							
Sepsis	•	•	•	•	•	•	•
Shock	•	•	•	•	•	•	•
Hypertensive disorders of pregnancy and eclampsia			•				
Severe anaemia		•	•	•	•	•	•
Blood replacement	•	•	•	•	•	•	•
Manual procedures and monitoring labour							
Manual removal of placenta				•	•		
Exploration of uterus				•	•		
Vacuum extraction						•	•
Partograph	•	•					
Management of women at high risk							
Maternity waiting homes	Places where women at high risk of complications can stay and receive supervision during the last month of pregnancy						
Family planning support							
Tubal ligation, vasectomy	To prevent unplanned or unwanted pregnancies						
Intrauterine contraceptive device (IUD)							
Oral, injectable and implantable contraceptives							

To prevent unplanned or unwanted pregnancies

^a A filled circle indicates that the element of obstetric care specified in the left-hand column is essential for the prevention of maternal mortality due to the named obstetric complication.

Morbidity and mortality after caesarean section depend to a large extent on the woman's state of health and on the condition of the fetus just before the operation is performed. If a pregnant woman develops a complication but the condition of the fetus is still good, the complication is at an early stage and its effects are not sufficiently serious to impair either maternal or fetal health. If the operation is performed at this stage, there will probably be fewer technical problems and anaesthesia will be straightforward; blood loss is likely to be minimal so that intravenous replacement of fluids will suffice and blood transfusion will probably not be needed.

However, if a pregnant woman develops a complication necessitating operative delivery, such as prolonged obstructed labour, the operation will probably be technically difficult to perform with a high risk of intraoperative and postoperative complications. Under these circumstances, and in the case of repeated caesarean section, which carries additional dangers, the most experienced health personnel available must perform the operation. If the operation is being performed to relieve obstructed labour, haemorrhage is likely to be profuse and hysterectomy may be required in order to arrest it. Postoperatively, pelvic sepsis with peritonitis and paralytic ileus may prove fatal. Antibiotics may therefore be life-saving when given in the presence of prolonged labour and prolonged rupture of membranes, and may shorten the postoperative hospital stay.

Efficient primary obstetric care and a functioning referral system will add considerably to the safety of caesarean section. Safety can also be enhanced by the use of partographs (see page 30) for monitoring labour and to prevent prolonged or obstructed labour. In advanced obstructed labour with cephalopelvic disproportion and in the presence of intrauterine infection, craniotomy may be preferable if the fetus is dead (see page 17). Similarly, decapitation may be performed in cases of a neglected transverse lie. Symphysiotomy is an alternative to caesarean section in certain circumstances.

Surgical treatment of sepsis

Posterior colpotomy and drainage of intra-abdominal abscess are life-saving surgical operations in the treatment of sepsis; appropriate expertise is therefore needed at first referral level. When ad-

Table 2. Surgical obstetrics in essential obstetric care at first referral level

Operation	Indications	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies	Remarks
Caesarean section	Major cephalopelvic disproportion Antepartum haemorrhage Severe hypertensive disorders of pregnancy Previous vesicovaginal fistula Malpresentation, especially transverse lie	Trained to perform caesarean section, e.g. obstetrician, general duty medical officer, medical/clinical officer, medical assistant, or professional midwife	Anaesthesia Blood transfusion or substitutes Operating theatre	Annex 2 A + B for laparotomy Doyen retractor Green-Armytage forceps	Use maternity waiting home when caesarean section is likely to be needed
Surgical treatment of sepsis	Severe sepsis with complications Peritonitis Septic shock	As for caesarean section	Anaesthesia Blood transfusion or substitutes Operating theatre	Annex 2 A + B, as for laparotomy	Referral to tertiary level imperative in cases of renal failure, bowel injury, tetanus, and gas gangrene
Repair of high vaginal and cervical tears	Prevention and treatment of excessive blood loss	As for caesarean section	Anaesthesia Blood transfusion or substitutes Operating theatre	Annex 2 A + B, as for laparotomy	

Table 2. (continued)

Operation	Indications	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies	Remarks
Laparotomy for repair of uterine rupture/hysterectomy	Uterine rupture after neglected obstructed labour, previous caesarean section or other obstetric trauma	As for caesarean section, but the most experienced person available should perform the operation as hysterectomy may be necessary	Anaesthesia Blood transfusion or substitutes Operating theatre	Annex 2 A + B for laparotomy	
Removal of ectopic pregnancy	Symptoms and signs of "acute abdomen" when the diagnosis of ectopic pregnancy is not in doubt	As for caesarean section	Anaesthesia Blood transfusion or substitutes Operating theatre	Annex 2 A + B for laparotomy For autotransfusion: funnel, gauze filter, gallipot and 500-ml bottle containing acid-citrate-glucose solution	Autotransfusion may be life-saving
Evacuation of uterus in abortion	Incomplete abortion	Trained to perform vacuum aspiration and curettage, to recognize complications and to give emergency treatment	Anaesthesia Blood transfusion or substitutes	Annex 2 E Ergometrine Oxytocin intravenous drip	Digital removal of uterine products can be done at primary level to save life if bleeding is profuse

Intravenous oxytocin infusion to augment labour	Inefficient uterine action in the absence of major cephalopelvic disproportion	Trained to assess the progress of labour and degree of cephalopelvic disproportion, prepare intravenous oxytocin solution and monitor the further progress of labour	Facilities for caesarean section (in case of need)	Oxytocin intra-venous drip
Amniotomy with/without oxytocin infusion	Severe hypertensive disorders of pregnancy Antepartum haemorrhage Placental abruption	As for caesarean section	Facilities for caesarean section (in case of need)	Kocher forceps or amniotomy hooks Annex 2 A + B if caesarean section proves necessary Oxytocin intra-venous drip, if needed
				Pressure fetal membranes as long as possible in cases of intra-uterine fetal death

² An obstetrician or general duty medical officer is usually required but, under certain conditions, some of the procedures may be carried out by suitably trained medical assistants/clinical officers or professional midwives.

hesions are present in the peritoneal cavity, and when renal failure, bowel injury, tetanus or gas gangrene complicates the picture, referral to a tertiary level hospital is imperative. Antibiotics should always be available for prophylactic administration when infection is anticipated.

Repair of high vaginal and cervical tears

Surgical repair of high vaginal and cervical tears is essential to prevent and treat excessive blood loss; if the tear extends to the lower uterine segment, hysterectomy may be the only means of controlling the bleeding.

Laparotomy for repair of uterine rupture or for hysterectomy

In places where pelvic contraction is common and the standard of obstetric care is poor, especially at community level, health services can expect to handle one case of uterine rupture for every 20 caesarean sections. Whether the operative treatment is to repair the rupture or perform a hysterectomy, the maternal mortality rate associated with this complication can be as high as 20%. Women who have received full prenatal care and have had access to referral facilities rarely die from uterine rupture.

Removal of ectopic pregnancy

Early detection of ectopic pregnancy is important. Lower abdominal pain and vaginal bleeding in early pregnancy or after a missed menstrual period should alert the health worker to this possibility and lead to referral to a facility where the diagnosis can be verified. Prompt treatment is vital since death can be averted only by arresting haemorrhage through removal of the pregnancy, securing haemostasis and replacing blood loss. Facilities should be available for autotransfusion, which can be life-saving in these cases, particularly where blood for transfusion is in short supply or where adequate screening facilities for infection with human immunodeficiency and hepatitis B viruses are not available. However, staff should be aware that infected or clotted blood is not suitable for autotransfusion.

Evacuation of the uterus in abortion

Rapid removal of the retained products of conception is necessary in cases of incomplete abortion, whether induced or spontaneous. Once evacuation is complete, rapid recovery is usual in most cases. Continuing ill-health after evacuation points to the fact that there may be serious injuries to the genital tract, and even to the bladder and gut in cases of unskilled abortion. In such cases, care in well equipped hospitals is necessary if the woman is to survive.

Countries where septic abortion is a major cause of maternal death should carefully review the circumstances under which it occurs and adopt the most appropriate means to prevent these deaths. The need for prevention rather than treatment must be stressed.

Intravenous oxytocin infusion to augment labour

Oxytocin infusion should be used to augment labour only in a facility equipped to perform caesarean section (Table 1). Although the procedure is not difficult, the personnel responsible should be aware of the serious dangers of its inappropriate or injudicious use, and that oxytocin should not be given to a woman who has previously undergone caesarean section. Artificial rupture of the membranes must be performed before augmentation of labour with oxytocin. The most dangerous complication of oxytocin infusion is uterine rupture.

Amniotomy with or without oxytocin infusion

Induction of labour by amniotomy, with or without oxytocin infusion, should only be done in a facility equipped for caesarean section. Suitable instruments are necessary for amniotomy to be performed efficiently. It is relatively safe and simple, but cord prolapse may occur if the presenting part is mobile above the pelvic inlet or ill-fitting; if labour does not progress, there is also a risk of intrauterine infection, which can usually be prevented by giving antibiotics.

Craniotomy

Craniotomy is an alternative to caesarean section in certain circumstances, and may be life-saving. It is performed mainly to relieve obstructed labour due to cephalopelvic disproportion in cases where the baby is dead. When there is advanced obstructed labour

and intrauterine sepsis has already set in, relief by craniotomy is preferable to caesarean section. The judgement and technical skill needed are in general greater than those required for the majority of caesarean sections. Uterine rupture is a possible complication and may require immediate laparotomy. As the availability and accessibility of obstetric services improve at primary and referral levels, the need for craniotomy decreases since earlier and safer caesarean section becomes possible.

Symphysiotomy

Symphysiotomy is an alternative to caesarean section in the management of moderate cephalopelvic disproportion. In areas where cephalopelvic disproportion is common and where women might not return to the health facility for future delivery after caesarean section, the advantage of symphysiotomy is that, by leaving the uterus intact, it avoids the risk of deaths from rupture of uterine scars. However, complications include damage to the urethra and significant orthopaedic hazards. Judgement in case selection, operative skill and competent nursing care are essential. There should be less need for symphysiotomy as maternity services expand and patients either undergo caesarean section instead or, because of better management of labour, no longer require symphysiotomy.

Anaesthesia

Although anaesthesia is not required for all obstetric procedures (for example, for manual removal of the placenta, intravenous pethidine and diazepam may suffice), facilities for conduction or general anaesthesia are needed for many of the procedures that are essential for preventing maternal death. A list of anaesthetic equipment is given in Annex 2J, and further details of anaesthetic techniques and equipment suitable for use at first referral level are provided in a WHO publication (5).

Conduction anaesthesia

Local anaesthesia by infiltration of the anterior abdominal wall may be valuable for caesarean section and the surgical treatment of uterine rupture and ectopic pregnancy when there is a contraindication for general anaesthesia. The technique is easy once it has been learnt, and local anaesthetic agents are inexpensive and readily available.

Spinal anaesthesia is useful for operative vaginal delivery and the operations mentioned above, but must not be used in haemorrhagic shock. Epidural anaesthesia is also used for operative vaginal delivery and caesarean section. Headaches and hypotension are common complications but the risk is lessened by the use of blood volume expanders before and during the operation.

General anaesthesia

Facilities for general anaesthesia and appropriate expertise will always be needed. At first referral level, more than half of the women requiring general anaesthesia will be unhealthy. Special attention must be given to women with severe anaemia or overt signs of blood volume depletion, and to those with sickling disorders—there are areas where nearly 20% of the population possess the sickle-cell trait, and some women with sickle-cell disease may not be recognized until they are seen for the first time in labour.

The provision of an adequate general anaesthetic service may be hampered by shortages of staff with relevant experience, lack of funds, poor maintenance of equipment, and problems in obtaining anaesthetic agents. The doctor who performs the operative delivery may also be expected to administer the general anaesthesia or to supervise someone else giving it. The choice of an anaesthetic technique with a reasonable margin of safety is therefore important. Ether, combined with air delivered through a draw-over system, such as the EMO (Epstein, Macintosh, Oxford), is excellent for this purpose.

Ketamine, which may be administered intravenously or intramuscularly, is useful in certain circumstances. It is a potent analgesic and anaesthetic agent with amnestic properties. Its disadvantages include prolonged amnesia and bizarre neurobehavioural changes, but these may be avoided by premedication with diazepam. Its main use is for caesarean section.

Medical treatment

Resuscitation equipment, specific drugs and blood transfusion facilities will be needed for the provision of obstetric medical treatment at first referral level. Treatment will be required for

Table 3. Medical treatment in essential obstetric care at first referral level

Condition requiring treatment	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies
Sepsis: Puerperal sepsis Post-abortion sepsis Mild sepsis	Able to give intravenous therapy		
Shock	Able to: Monitor vital functions and urinary output Set up an intravenous infusion Manage the cause of haemorrhage	Blood transfusion or substitutes	

Severe hypertensive disorders of pregnancy and eclampsia	<p>Able to:</p> <ul style="list-style-type: none"> Monitor vital functions Give emergency treatment for convulsions Recognize complications, e.g. renal failure 	Eclampsia room if possible	<p>Resuscitation equipment</p> <ul style="list-style-type: none"> Magnesium sulfate Diazepam Hydralazine
Severe anaemia already present during pregnancy or due to blood loss	<p>Able to:</p> <ul style="list-style-type: none"> Assess the degree of anaemia Recognize complications of anaemia Estimate blood loss Set up an intravenous infusion 	<p>Blood transfusion or substitutes</p> <p>Haemoglobin and haematocrit measurement</p>	<p>Resuscitation equipment</p>

^a These conditions are usually managed by medical officers but treatment may also be given by suitably trained medical assistants/clinical officers and professional midwives.

such conditions as sepsis, shock, severe hypertensive disorders of pregnancy, eclampsia and anaemia (Table 3). These conditions are usually managed by medical officers but treatment may also be given by suitably trained medical assistants and professional midwives.

Sepsis

Antibiotics, given with analgesics and sedative drugs, are often effective in controlling mild infections. If the signs of infection persist after 48 hours of treatment or get worse, referral to a secondary or tertiary level of care is mandatory. Metronidazole is becoming increasingly important in the treatment of anaerobic infections.

Shock

Adequate restoration of blood volume is important in the treatment of shock, and blood transfusion may be required. It is most important to identify and treat the underlying cause, most often haemorrhage or sepsis or both.

Severe hypertensive disorders of pregnancy and eclampsia

In patients with eclampsia, more than in the case of most other major obstetric causes of maternal death, survival is heavily dependent on how quickly complications such as acute renal failure are recognized and how rapidly the appropriate treatment is given. Even in tertiary health care centres in developing countries, case fatality rates of 10% are not unusual, particularly in women who have had no prenatal care. Management consists of control of seizures, using intravenous or intramuscular magnesium sulfate or intravenous diazepam, and prompt delivery of the fetus. If these drugs are not available, a combination of chlorpromazine, pethidine, and promethazine may be used. For the control of high blood pressure, an intravenous infusion of hydralazine may also be needed.

Anaemia

Most women with anaemia respond satisfactorily to oral drug treatment, provided the treatment given is appropriate to the predominant cause of anaemia in the area (ferrous sulfate is effec-

tive in cases of iron deficiency anaemia but antimalarials and folic acid are needed to treat anaemia due to malaria, and where megaloblastic anaemia is prevalent, iron and folic acid should be given).

Blood transfusion (preferably packed red blood cells) is needed when the degree of anaemia is life-threatening.¹ Severe anaemia by itself can cause maternal death when the haemoglobin level drops below 40 g/l or the haematocrit (erythrocyte volume fraction) below 0.15. Anaemia of such severity can also easily be complicated by heart failure, with fatal outcome. A woman with less severe anaemia may also require blood transfusion if haematinics and antimalarial drugs are unlikely to correct the anaemia before she goes into labour.

Intravenous infusion of a "total dose" of iron (i.e. the complete iron requirement) can be used to treat anaemia by restoring body iron stores to normal if severe anaemia has not responded to oral treatment during pregnancy or if iron stores have been depleted by obstetric or postoperative haemorrhage. Intramuscular promethazine should be given 30 minutes beforehand since anaphylactic reactions sometimes occur.

Anaemia is largely preventable at community level and the subject is an important component of primary health care (see, for example, 3).

Blood replacement

Facilities for blood replacement are essential at first referral level (Table 4). Blood transfusion is often life-saving, especially in developing countries, and can be performed by any medical officer, medical assistant, clinical officer, professional midwife or laboratory worker with suitable training. However, staff should be aware that blood transfusion carries risks, and that in certain cases it may do harm rather than good. For example, most women with gross plasma volume contraction, and therefore a high haematocrit (erythrocyte volume fraction 0.45 or greater), will die from the

¹ Staff should be aware that the best way to prevent circulatory overload when transfusing anaemic patients is to give only packed blood cells and to restrict the volume transfused each day to the packed blood cells of one unit of blood, at the same time giving furosemide intravenously to provoke diuresis. Even under normal working conditions in developing countries it is not difficult to obtain packed blood cells from donor blood: if a bag of donor blood is inverted and left in that position for about half an hour, the blood cells will settle at the lower end of the blood bag and can then be allowed to run slowly into the patient, leaving the plasma in the bag.

Table 4. Blood replacement in essential obstetric care at first referral level

Indications	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies	Remarks
Operative deliveries Severe anaemia Haemorrhage	Trained in blood cross-matching and transfusion techniques	Direct donor/patient cross-matching Transport of donor blood from regional or national centre Maintenance of small local blood bank Laboratory	Annex 3	The level of service needed will depend on the number of transfusions required, the level of skill available and ease of patient transport

^a Blood transfusion can be performed by any medical officer, medical assistant/clinical officer, professional midwife or laboratory worker, given suitable training.

effects of hyperviscosity if the blood they lose during labour or operative delivery is replaced by blood transfusion rather than by, for example, 0.9% isotonic saline.

Blood transfusion is often indicated for volume replacement in the treatment of haemorrhage and shock. Whether or not blood transfusion is required for this purpose depends not only on the volume of blood lost, but also on the speed of the loss and the physical condition of the woman. Women in good physical condition can tolerate blood loss to a greater degree than women in poor health. For example, a loss of one litre may be tolerated quite well by a healthy woman, whereas a loss of as little as 200 ml of blood may easily be fatal to an anaemic woman.

Replacement by blood transfusion is not necessary in every case of blood loss; plasma volume expanders, solutions of dried plasma and even physiological saline are useful alternatives. However, blood loss leads to depletion of iron stores, which are best replenished by total dose iron infusion within the first three days after such loss, and certainly before the patient leaves hospital.

Blood transfusion services

The establishment of blood transfusion services is beset with many problems apart from those associated with shortages of material, equipment and personnel (6). The lack of basic infrastructure is a major constraint; donors are not easy to recruit because of strongly held cultural and religious beliefs against blood donation, storage and transfusion, and during religious fasting periods blood donation is sure to be interrupted.

Ideally, donor recruitment should be voluntary, but this is not always possible in developing countries. If voluntary donors are not available, there are two options: one is to encourage family blood donation so that whenever a patient is to have a planned operation, members of the family are asked to donate blood. The other option is to use paid donors, with the disadvantage that they are more likely to be unfit. They may be poorly nourished with haemoglobin levels at the lower limit of normal, and may also be infected with transmissible diseases.

In many developing countries it is often impracticable to screen all blood and blood products for irregular antibodies and transmis-

sible diseases such as hepatitis B, syphilis, malaria, AIDS, trypanosomiasis, typhoid and brucellosis. Two of these conditions, AIDS (7) and hepatitis B, present a special risk to health workers of contamination by the infected blood of those they are treating. The immediate, and especially the remote, risks to patients are also considerable. Disease transmission is a special risk in places where syphilis, hepatitis B, viral infections and AIDS are common. In many parts of Africa, the carrier rate for hepatitis B virus is as high as 10%, compared with only 0.1% in developed countries. Most diseases transmitted through blood transfusion only become manifest several weeks or months later, so that patients seek help or die elsewhere without being seen by the health workers who were responsible for the initial blood transfusion. A further problem in some areas may be a lack of facilities for proper cross-matching, in which case only group-compatible blood is transfused, with all the attendant risk of serious transfusion reactions. Given the dangers involved, the decision to transfuse with blood or its products, rather than to use plasma expanders, should be based on sound physiological grounds. The frequency of ill-effects related to blood transfusion in obstetric practice in developing countries is in most cases not known.

Solutions to the problems of blood donation and storage and maintenance of adequate supplies do exist. In some cases, blood grouping and direct cross-matching of recipient and donor blood, and immediate transfusion of the donor blood may be all that is possible. The equipment needed is listed in Annex 3. An alternative is to maintain a small storage facility at first referral level. Domestic refrigerators are suitable for this purpose, but refrigerators that open at the top are preferable.

For maximum safety, the establishment of a national blood transfusion service, with blood banks at tertiary level hospitals, is the best option. Blood from this source can then be transported at weekly intervals to replenish stocks held in domestic refrigerators in first and second level hospitals. The success of this scheme relies heavily on the development of a basic infrastructure, particularly transport, and on appropriate technical support.

Manual procedures and monitoring labour

Procedures that can be carried out manually and do not require elaborate equipment include manual removal of the placenta,

exploration of the uterus for rupture arising from a previous caesarean section, repair of episiotomies and perineal tears, vacuum extraction, forceps delivery, and assessment of the progress of labour by use of a partograph (Table 5). These procedures do not need the level of training, skill and experience required for surgical obstetrics but are nevertheless of great importance at first referral level and should be included in the training and job description of all professional midwives. Vacuum extraction and forceps delivery, even though not life-saving for the mother, play a role in prevention of morbidity and can be life-saving for the fetus.

Manual removal of the placenta

The need for manual removal of the placenta can arise after any vaginal delivery, and midwives should be trained to carry it out at primary health care and at first referral level. The longer the placenta is retained, the greater the hazards, death in these cases being due to shock from haemorrhage and infection. It is best if manual removal of the placenta is carried out within the first hour after delivery. In some circumstances, the placenta may be retained for 48 hours or longer before the woman reports for treatment. In such cases severe anaemia and septicaemic shock may ensue and treatment is best provided at a tertiary level hospital.

Exploration of the uterus following vaginal delivery after previous caesarean section

After vaginal delivery of women who have had a previous caesarean section, it is important to explore the uterus to check for opening of the scar (dehiscence) or rupture.

Repair of episiotomies and perineal tears

Episiotomies and perineal tears should be repaired quickly or haemorrhage may cause death. Repair can be done under local anaesthesia and does not require an operating theatre.

Vacuum extraction

Vacuum extraction is used to expedite delivery when the woman is unable to achieve vaginal delivery by her own efforts. Similar-

Table 5. Manual procedures and monitoring labour in essential obstetric care at first referral level

Procedure	Indications	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies	Remarks
Manual removal of placenta (whole or part)	To stop or prevent postpartum haemorrhage	Able to manage labour, do a pelvic examination and set up an intravenous infusion Trained to perform manual removal of placenta	Anaesthesia Blood transfusion or substitutes Antiseptic and aseptic conditions	Analgesics Antibiotics Ergometrine Oxytocin	If placenta is retained 48 hours or longer, referral to the tertiary level is indicated
Exploration of uterus	Following vaginal delivery after previous caesarean section	As for manual removal of placenta	Blood transfusion or substitutes Antiseptic and aseptic conditions	Analgesics Antibiotics Ergometrine Oxytocin	

Vacuum extraction to hasten delivery in second stage of labour	Adverse maternal conditions Eclampsia Fetal distress	Able to conduct a normal delivery, do a pelvic examination, and assess progress of labour and degree of cephalopelvic disproportion Trained to perform vacuum extraction	Antiseptic and aseptic conditions Instrument sterilizing equipment	Annex 2 C	Vacuum extractor, preferably manually operated, with accessories; durable rubber parts essential, especially in tropical climates
Partograph	Monitoring progress of labour	Able to assess progress of labour accurately by abdominal palpation and vaginal examination Trained to enter information correctly on partograph and interpret findings	Antiseptic and aseptic conditions	Partograph	Universally applicable, its use should be encouraged to monitor all labours, especially where cephalopelvic disproportion is common

^a These functions should be included in the training and job description of all professional midwives.

ly, in cases where towards the end of labour a baby shows signs of distress, vacuum extraction can effect rapid delivery of the baby and so save its life. Significant fetal distress in the presence of cephalopelvic disproportion is a contraindication for vacuum extraction. Annex 2C lists the instruments needed for this procedure. Vacuum extraction is intrinsically safer for the mother than other forms of operative delivery, provided that the criteria for its use are adhered to. Adverse climatic conditions and lack of accessories may make it difficult to keep a vacuum extractor in good working order.

Forceps delivery

Low-cavity forceps delivery is a good alternative to vacuum extraction, but greater skill is required. The instruments needed are listed in Annex 2C.

The partograph

The main difficulty in preventing prolonged and obstructed labour is the accurate recognition of the degree of cephalopelvic disproportion, either antepartum or during labour. A partograph is designed to display the essential features of labour against the passage of time during the first stage of labour (8–10). It records fetal condition, labour progress and maternal condition, providing a visual display of the progress of labour and immediately alerting the attendant to abnormal developments. In this way the partograph acts as an “early warning system” for the detection of inefficient uterine action and cephalopelvic disproportion.

The partograph is a useful tool in the management of labour at all levels of maternity care in many countries and, when used in peripheral clinics, has contributed to a reduction of prolonged labour and its sequelae through earlier referral. Its value in relation to the termination of labour by caesarean section has already been mentioned. Midwives of all levels can be taught to use and interpret partographs correctly, leading to fewer cases of prolonged labour and reduced maternal morbidity and perinatal mortality. After introduction in the periphery, continued use of the partograph needs encouragement and regular supervision by staff at first referral level, including discussion of cases and feedback on referrals.

Management of women at high risk

Provision should be made at first referral level for women needing special care during pregnancy or labour. In addition to appropriate prenatal care, which is important at all levels of health care, maternity waiting homes may be of particular benefit to women at high risk.

Prenatal care

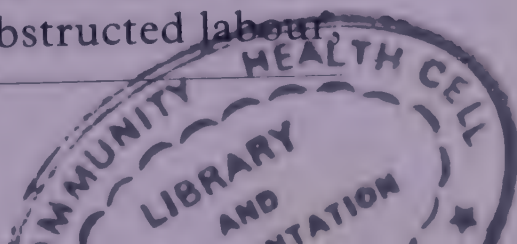
Prenatal care is an essential obstetric function at all levels of health care—primary, secondary and tertiary. Everything possible must be done to promote it.

At first referral level, prenatal care must be provided as part of educational and preventive activities. At this level, the hospital can set an example of the expected standards of care and can sometimes act as a training centre for those responsible for prenatal care at other levels.

Maternity waiting homes

A maternity waiting home close to, or within the grounds of, the district or provincial hospital could form an important part of maternity care in a rural setting where women often have far to travel and transport is poor. Through health promotion and education, community participation should be encouraged in building and maintaining such a home and organizing transport for referral. The home is intended for pregnant women at risk; priority should be given to women with major obstetric abnormalities and for whom operative delivery is anticipated, but whose homes are in remote and inaccessible rural areas. Pregnant women who have previously had a caesarean section or repair of vesicovaginal fistula, and those at risk of obstructed labour are the commonest occupants. Such women, having received prenatal care at their local primary health centres in the first eight months of pregnancy, should be transferred in the last month to the maternity waiting home to continue receiving prenatal care, and to await either elective operative delivery or transfer to the labour ward as soon as labour starts.

Maternity waiting homes, properly run and supervised, are highly effective in preventing the complications of obstructed labour.



especially uterine rupture and obstetric fistulae (11). More attention should be focused on this little publicized, but highly important, approach to obstetric care at first referral level in rural hospitals, and the results should be evaluated and published.

Family planning support

Provision of a full range of family planning services at first referral level is indispensable (Table 6). Family planning has been included in essential obstetric functions because advances in prevention and reduction of maternal mortality from all major causes are partly dependent on progress in family planning. For example, where maternal mortality from illegal and unskilled abortion is high, contraception is the first line of defence against unwanted and high-risk pregnancies, particularly in young teenagers or women with high parity. High-parity women often enter pregnancy at a disadvantage from repeated childbearing and are consequently at greater risk of death due to anaemia, haemorrhage, sepsis and rupture of the uterus. Control of grand-multiparity through appropriate family planning can be expected to reduce the number of deaths among such women.

Family planning is an essential part of total health care and must be introduced in an appropriate manner into preventive and curative care programmes at all levels. The aim must be to make family planning services widely available and to provide a high standard of care, which is particularly important if acceptance of family planning and continued attendance at clinics are to be encouraged and maintained. All training schools for health professionals should ensure that their graduates have a thorough understanding of the determinants and implications of human fertility, and are competent in counselling and in providing and supervising family planning services.

Family planning counselling should be an integral part of prenatal and postnatal care. Certain family planning activities, especially those of a surgical nature, need to be performed at first referral level, but others, like the insertion of intrauterine devices (IUDs) and of Norplant (a contraceptive subdermal implant) and the distribution of oral and barrier contraceptives, may also be performed at primary level with back-up and support from first referral level. Guidelines on IUDs and oral contraception have

Table 6. Family planning support in essential obstetric care at first referral level

Method	Indications	Level of skill required ^a	Facilities and additional procedures	Special equipment and supplies
Tubal ligation	Female sterilization	Able to perform laparotomy or mini-laparotomy	Anaesthesia Operating theatre	Annex 2A + B for laparotomy Annex 2G for mini-laparotomy
Vasectomy	Male sterilization	Trained in minor surgical procedures	Anaesthesia Antiseptic and aseptic conditions	Annex 2H
Intrauterine contraceptive device (IUD)	Child-spacing or temporary contraception	Able to perform and interpret pelvic examination and to exclude early pregnancy, pelvic inflammatory disease, sexually transmitted diseases Trained in IUD insertion	Aseptic conditions	Annex 2G sterilized kit
Contraceptive subdermal implant (Norplant)	Long-acting hormonal contraception	Trained to insert and remove implant	Aseptic conditions	Implants and inserter
Oral contraception	Child-spacing	Aware of contraindications		

^a Medical officers, medical assistants/clinical officers and professional midwives may all be trained to perform the procedures listed.

been published by WHO (12, 13) and guidelines on the implantation and removal of Norplant are also available (14).

Sterilization

Sterilization is the most effective method of contraception. The procedures are relatively simple and safe and any risk must be weighed against the risk of pregnancy itself. The advantages and disadvantages must, however, be explained very carefully in view of the virtual irreversibility of many of the procedures. There are differences in the skills, facilities and equipment needed for male and female sterilization: female sterilization requires an operating room, more staff and more surgical equipment; male sterilization is less demanding and can therefore also be done in remote rural areas.

Mini-laparotomy for tubal ligation, as an interval or postpartum procedure, is well established. The technical aspects are documented in a WHO publication (15). Tubal ligation can, of course, be carried out during a laparotomy for other reasons, for example in women admitted for emergency treatment of uterine rupture or undergoing caesarean section. The instruments needed are listed in Annex 2G.

Fears still exist about contraception, more so about vasectomy than any of the other methods; therefore comprehensive counselling in readily understandable terms is especially important. Essential information for couples contemplating sterilization by vasectomy should include details of the operation and its effects and an explanation of the need for postoperative contraception and tests for sterility. Technical and managerial guidelines for vasectomy services have been published by WHO (16). The instruments needed are listed in Annex 2H.

Clinical services for induced abortion are not mentioned separately. Whether such services are provided depends entirely on each country's laws, national health policies, priorities, needs and resources. The skills and facilities required correspond to those listed for evacuation of the uterus in uncomplicated abortion. Detailed information on the provision of care and services for induced abortion is available in a WHO publication (17).

Intrauterine contraceptive devices

The skill of the person inserting the IUD and the quality of counselling, selection, reassurance and follow-up are important determinants for the success of an IUD programme. Studies from developed and developing countries show that nurses, midwives, primary health workers and rural village midwives can perform routine IUD insertion very well.

Aseptic techniques must be used for insertion of IUDs; the equipment needed is listed in Annex 2F.

Implantable contraceptives

The insertion and removal of the implantable contraceptive Norplant, containing the synthetic progestogen levonorgestrel, require appropriate clinic facilities and aseptic conditions (18). Health care personnel can easily be trained to insert and remove the capsules, and should also be prepared to provide women with information on all aspects of the method, including the procedure itself, where to go for removal of the implant and alternative methods of contraceptive protection.

Injectable contraceptives

Injectable hormonal contraceptives are highly effective in allowing the spacing of pregnancies. Those currently available, which contain only a progestogen, can be used by lactating women. Appropriate referral facilities and staff should be available to manage the small number of women who suffer the serious side-effect of prolonged uterine bleeding. The commonest side-effect is amenorrhoea, which can usually be managed at the primary health care level without referral.

Oral contraceptives

Oral contraceptives can be used to space pregnancies and to postpone a first pregnancy in the older adolescent. Combined oral contraceptives (containing both an estrogen and a progestogen) are not recommended during breast-feeding, particularly in the first six months, because of possible adverse effects on lactation. Their use should also be limited to women below the age of 40 or, if they are smokers, below the age of 35 years.

Health personnel responsible for distributing oral contraceptives should be able to screen for absolute and relative contraindications for their use, which can be done effectively through a simple check-list. The benefits of oral contraception in reducing maternal mortality far outweigh the risks.

Neonatal special care

Neonatal special care deserves consideration in a discussion of requirements for essential obstetric care. In seeking to upgrade maternity care at first referral level, it would be unrealistic to exclude requirements for looking after newborn infants who are often in poor condition having survived high-risk pregnancies or complicated labour.

Some neonates—particularly those that are premature or dysmature or have been subject to stress in obstructed labour—may suffer from severe asphyxia and are particularly vulnerable to temperatures below 20°C, which may result in hypothermia. These conditions are mutually aggravating and can in turn result in neonatal hypoglycaemia. Failure to dry and wrap the neonate immediately after delivery greatly increases the risk of hypothermia. Prompt and efficient resuscitation and maintenance of body temperature are essential, not only for survival of the infant but also for the prevention of sequelae from birth trauma. For this reason, basic resuscitation equipment (in particular a bag and mask of the appropriate size and shape) in good working order must be available in the labour ward, together with an oxygen supply and a heat source. All health professionals should be trained in resuscitation of newborn infants—the quality of life of the infant may depend on their proficiency. The equipment needed is listed in Annex 2I.

3

Implementation

Decisions on the implementation of any or all of the recommendations in a particular country will depend upon circumstances at national, regional and local levels. Needs vary between and within countries depending upon both the size of the maternal mortality problem and the relative importance of the different causes; facilities appropriate to the particular clinical problems of the region can be planned for each referral centre. For example, in some areas, the main problem may be contracted pelvis, leading to cephalopelvic disproportion and obstructed labour; in others, it may be eclampsia. Postpartum haemorrhage may be the main killer in regions where high parity is common, and ectopic pregnancies are most common where sexually transmitted diseases and thus tubal infections are frequent. In countries where induced illegal abortion results in many maternal deaths, particular attention will need to be given to ways of preventing them.

Population density and size, the distribution of settlements and communications, and availability of transport vary from place to place and, together with the types and numbers of health staff available, will all influence the ways in which essential obstetric services are organized at first referral level.

Health personnel

Two important axioms underlie the approach to essential obstetric care at first referral level: first, that health services should be made available as close to people's homes as possible; and second, that any health care procedure should be carried out by the least trained person who is fully competent to perform it safely and effectively.

Grouping essential elements of obstetric care according to the level and type of skills required is important because it allows a more rational allocation of functions between different categories of health personnel. In some countries, for instance, midwifery staff are not permitted to perform manual removal of the placenta, whereas in others, this vital procedure is a normal part of the

practice of health workers with comparable levels of training and experience. Nevertheless the use of the partograph, manual removal of the placenta, and the use of the vacuum extractor involve manual and assessment skills that are basic to the work of all trained midwives; all midwives should therefore be competent to carry out these functions.

Medical treatment procedures require a greater understanding of normal and abnormal physiology and basic pharmacology. These are part of the daily work of doctors but, in many countries, professional midwives and medical assistants/clinical officers are also routinely trained to carry them out. Surgical procedures such as caesarean section and the repair of high vaginal or cervical tears are often carried out by obstetricians; in many countries, however, they are considered part of the work of general medical officers, whose basic training is organized to ensure that they acquire these skills before they are posted to hospitals or major health centres without specialist obstetric services. In other countries, where there is a great shortage of doctors, selected and experienced medical assistants/clinical officers and professional nurses and midwives have been given extra training so that they are able to perform such operations.

The need for a cohesive health team is very important at first referral level. Any attempt to expand essential services further to the periphery may impose a strain on the supply of available personnel, especially those with higher levels of training. If a doctor is to be the most senior person at first referral level, there will be many demands, not just obstetric, on his or her time and energy. For efficient running of the obstetric service, the doctor should delegate as much work to midwives and other staff as they are able to carry out. In this situation, it is important to increase the potential of each health worker by giving additional training and ensuring that the necessary level of competence is acquired.

This approach has the advantage of extending the skills of existing staff without necessitating a great increase in overall numbers. Changes in basic training programmes will be needed together with the provision of adequate in-service training for staff already employed. An additional advantage is that if the skills of any group of midwifery-trained health workers are increased, the benefit will be felt not only at first referral level but also at primary level, since basic procedures like manual removal of the placenta and the use of

the partograph will be brought even closer to women whose lives may depend upon them. The workload at referral levels will consequently be reduced.

However tasks and responsibilities may be distributed, it is important that health staff at first referral level should, as a team, be able to fulfil all the essential elements of obstetric care described. Training programmes should therefore be designed to this end and, in addition, provision should be made for continuing education of health staff so that their skills are maintained (e.g. provision of in-service training, workshops, manuals, books and journals). Permanent solutions, not temporary measures, are needed to reduce maternal mortality in developing countries.

Facilities

In planning the buildings and layout for maternity facilities, knowledge of the workload envisaged is critical. Facilities should cater for all abnormal deliveries taking place in a catchment area with a total population of, say, 100 000 people, together with a fair proportion of women with pregnancy complications, and others who are self-referrals. To estimate the number of abnormal deliveries, certain assumptions can be made. For example, on the basis of reports from various areas in developing countries, in particular Africa and India, it can be assumed that the crude birth rate is 40 per 1000 population; that 5% of all deliveries will be assisted or operative deliveries; and that at least half of the operative deliveries will be caesarean sections. On these assumptions, each year there would be in the catchment area some 4000 deliveries, of which 200 would be operative deliveries and 100 caesarean sections. Some spontaneous deliveries and all operative deliveries would be conducted at the maternity centre at first referral level, where on average two caesarean sections would be required each week. (These numbers need to be modified according to the actual population to be served.)

The following sections are not intended to cover all features of each component of maternity facilities but aim to highlight the principal ones. Details of the construction of and equipment for special facilities are given in a WHO publication (19) and in Annex 5.

Maternity ward

The maternity ward differs from a general ward in that it accommodates not just pregnant women and delivered mothers but also their newborn babies. A total complement of 24 beds will suffice at first referral level if assumptions are made as detailed above and as follows. If 25% of the estimated 4000 deliveries per year are high risk or the woman is referred for delivery, the ward should be capable of giving delivery care to 1000 women a year. If each patient stays on average five days in hospital (some may stay longer because of complications), each bed can accommodate about 60 patients a year. A maternity unit responsible for 1000 deliveries a year will therefore need 17 beds, plus a number of additional beds for patients requiring prenatal care. The proportion of beds assigned for prenatal and postnatal care should remain flexible; however, if one bed for prenatal care is allowed for every three for postnatal care, an additional six beds will be needed. The total number of obstetric beds for a unit that conducts 1000 deliveries a year should thus be about 24 beds.

Eight beds should be reserved for patients with septic conditions following delivery or abortion. Ideally, the “septic” and “clean” areas of the maternity ward should be separate and no facilities or equipment should be shared between them, the aim being to minimize the risk of spread of infection, especially among newborn babies. In some countries this particular need is rarely met. A useful compromise is to make extra washing facilities available throughout the maternity ward.

The distance between adjacent beds should be not less than 1.2 metres, and the bed ends should be about 2 metres apart. This provides sufficient room for cots as well as for medical and nursing functions to be carried out.

Labour/delivery suite

The delivery suite should have easy access to both the operating theatre and the maternity ward and should be close to one of the main entrances to the hospital itself. Accommodation should comprise a labour/delivery room, with space for resuscitation of a severely asphyxiated baby, a recovery room and, if possible, an eclampsia room. Six to eight beds will be sufficient for the labour/delivery room.

Operative vaginal deliveries not needing general anaesthesia can all be safely conducted in the delivery room. The eclampsia room should be separate from the delivery room, but equal in floor space, with enough room to provide intensive care for one patient and to conduct assisted vaginal delivery.

Recovery room

Very early discharge from hospital, within 6–12 hours after normal delivery, is popular with women in developing countries. A room with four to six beds adjacent to the delivery room or close to it can be set aside for recovery after normal delivery, prior to the mothers' discharge. Early discharge from hospital has obvious merits but the risk of puerperal and neonatal complications will always exist. Ideally, therefore, early discharge should be combined with home visits by community nurses, although such arrangements rarely exist in developing countries.

Side-ward laboratory

Many obstetric emergencies occur outside normal laboratory working hours. Certain laboratory tests need to be performed and the results made known immediately if appropriate treatment is to be given without delay. A side-ward laboratory is necessary and should be adjacent to the labour ward because this is where the need is greatest. The measurements and tests to be carried out are: determination of haematocrit, haemoglobin values and blood counts; preparation of smears of blood and other body fluids such as cerebrospinal fluid; examination of the urine for blood, protein, glucose, acetone, bilirubin, urobilinogen, etc; and blood grouping and cross-matching. Details of the materials needed are given in Annex 3.

Outpatient services

The organization of outpatient services is geared towards early prevention and detection of most of the important causes of maternal mortality and morbidity, by means including immunization, health education and family planning. Not all women can be seen at the same time in the consulting and examination rooms and, for this reason, a large waiting area or hall that can accommodate up to

200 women and their relations, including husbands and young children, is necessary. This waiting area can also be used for health education and for demonstrations given by the nursing staff. Supporting facilities should include toilets, wash-basins, provision of drinking-water and good ventilation. Outpatient accommodation in hospitals usually has to be shared between services and for this reason facilities and equipment are not included in the Annexes.

Maternity waiting home

A pregnant woman transferred to a maternity waiting home is usually accompanied by one or two relatives, who may also need to be accommodated. Water, fuel for cooking and space for laundry should be provided. Such homes usually accommodate about ten pregnant woman and are self-catering to allow for differences in nutritional habits.

Operating theatre

The operating theatre is an essential component of obstetric services although its use is shared with other areas in the hospital. The equipment relevant to obstetrics is listed in Annexes 2 and 5.

Staff welfare and accommodation

Quality and continuity of staff are determinant factors in the development of an obstetric service at first referral level. In rural areas, health staff often have to work and live under difficult conditions. The provision of adequate accommodation for these staff is essential in ensuring their welfare and should be included in the programme: it may mean the difference between success and failure. Similarly, arrangements for schooling of children and in-service education for staff will do much to increase their motivation.

Equipment, supplies and drugs

The equipment, supplies and drugs needed for an obstetric service at first referral level are listed in Annexes 2 to 5; many of the items appear in the UNICEF/UNIPAC catalogue 1990¹ and the WHO

¹ Available from UNICEF, UNICEF Plads, Freeport, DK-2100, Copenhagen ø, Denmark (Telephone 01-262444; Cables UNICEF Copenhagen; Telex 19813).

list of essential drugs (20). Ensuring adequate supplies is critical. The supply of consumable items should not be allowed to run out before orders for fresh supplies are made: there should still be sufficient to last for eight months when new orders are placed.

Supervision

The importance of supervision at first referral level to develop and maintain the necessary standard of skills among staff is stressed. Regular visits by the nearest obstetrician or midwifery supervisor to review cases, discuss referrals and problems, and ensure that facilities, equipment and supplies are adequate will help to maintain morale as well as technical competence. The provision of written instructions for carrying out different procedures, as agreed by senior professionals, has been found in many countries to be an invaluable method of maintaining skills.

Evaluation

It is expected that the extension of essential obstetric services will have an impact on the health care of women. Simple reporting systems at both primary and first referral levels will indicate the number of women from the local population making use of obstetric services. Any increase in coverage can then be calculated. A record of the proportions of normal and complicated deliveries at first referral level will also give useful information. For instance, in many populations 5% of all pregnant women are delivered by caesarean section. If the percentage of caesarean sections at the hospital or centre is found to be significantly less, there may be problems to be identified and remedied. Finally, careful recording of the outcomes of all complicated deliveries will indicate whether the effectiveness of the service is improving or not.

Research

Consideration of essential elements of obstetric care at first referral level and the skills and materials needed opens up many areas for further research. Research is needed on appropriate technology, for example, to develop reliable and inexpensive methods for detecting and measuring anaemia, durable tubing for vacuum extractors, and simple and effective partographs for use at primary level.

Health systems research is needed to investigate the effects of delegating obstetric functions to health workers other than doctors and to peripheral health facilities.

Cost and financial considerations

The provision of essential obstetric care, as described in this publication, should not, for most countries, entail the creation of a large number of new district and subdistrict hospitals; rather, it implies some new establishments and the upgrading of others, such as health centres in appropriate locations. Although upgrading costs money, the community and local authority may well contribute voluntarily, at least in labour and possibly also in cash or kind.

An approximate breakdown of the proportional costs of building and equipping such facilities is as follows:

Primary building structure	35%
Secondary structure and finishes	25%
Equipment and furniture	15%
Electrical	11%
Plumbing	8%
Mechanical	4%
Sewerage	2%

For maternity waiting homes near the hospital, which should provide accommodation resembling a typical home, community participation is important, not only when deciding on the need for such a home, but also in its building and management. Occupants should provide their own food, so that only maintenance, water supply, fuel, general cleaning and supervision will be additional costs to the government, nongovernmental organizations or the community.

Equipment costs money, but in poor countries charitable missions and other nongovernmental organizations often find that items such as operating tables or electricity generators are among the easiest items for which to raise money. On the other hand, supplies and all other recurring costs—for the maintenance of buildings and vehicles and for fuel and salaries—have to be planned carefully in advance and funds secured. These may be central, provincial or district government funds, fees for service, or a mixture of any or all of these.

While it is necessary to upgrade existing health centres and make better use of existing staff, a significant addition to the total workload of the service will also entail some increase in personnel in most cases and possibly some increase in remuneration. The budget must also include provision for the cost of training, in-service training and supervision.

Since efficient transport for referral is essential, some budgetary provision for this is also advisable.

The cost of providing essential obstetric care at first referral level may vary greatly within and between countries according to the administrative and managerial skills deployed and the community support enlisted. Prenatal care and basic health and family planning services at community and first referral levels in developing countries can be provided at an annual cost of less than US\$2 per head, according to a recent estimate by the World Bank, which concludes that "upgrading and expanding referral services and stronger community efforts in maternal health and family planning should reduce maternal deaths by at least half in about a decade" (21).

References

1. *Maternal mortality rates: a tabulation of available information*, 2nd ed. Geneva, World Health Organization, 1986 (unpublished document FHE/86.3; available on request from the Division of Family Health, World Health Organization, Geneva, Switzerland).
2. ROYSTON, E. & ARMSTRONG, S., ed. *Preventing maternal deaths*. Geneva, World Health Organization, 1989.
3. DEMAEYER, E. M. ET AL. *Preventing and controlling iron deficiency anaemia through primary health care: a guide for health administrators and programme managers*. Geneva, World Health Organization, 1989.
4. COOK, J. ET AL., ed. *Surgery at the district hospital: obstetrics, gynaecology, orthopaedics, and traumatology*. Geneva, World Health Organization, 1991.
5. DOBSON, M. B. *Anaesthesia at the district hospital*. Geneva, World Health Organization, 1988.
6. HOLLAN, S. ET AL. *Management of blood transfusion services*. Geneva, World Health Organization, 1990.
7. *Guidelines for treatment of acute blood loss*. Geneva, World Health Organization, 1988 (unpublished document WHO/GPA/INF/88.5; available on request from the Global Programme on AIDS, World Health Organization, Geneva, Switzerland).
8. *The partograph: a managerial tool for the prevention of prolonged labour (Section I, The principle and strategy)*. Geneva, World Health Organization, 1988 (unpublished document WHO/MCH/88.3; available on request from Maternal and Child Health, World Health Organization, Geneva, Switzerland).
9. *The partograph: a managerial tool for the prevention of prolonged labour (Section II, A user's manual)*. Geneva, World Health Organization, 1988 (unpublished document WHO/MCH/88.4; available on request from Maternal and Child Health, World Health Organization, Geneva, Switzerland).
10. *The partograph: a managerial tool for the prevention of prolonged labour (Section III, Facilitator's guide)*. Geneva, World Health Organization, 1989 (unpublished document WHO/MCH/89.2; available on request from Maternal and Child Health, World Health Organization, Geneva, Switzerland).
11. POOVAN, P. ET AL. A maternity waiting home reduces obstetric catastrophes. *World health forum*, 11(4): 440-445 (1990).
12. *Intrauterine devices: their role in family planning care*. Geneva, World Health Organization, 1983 (Offset Publication, No. 75).
13. *Oral contraceptives: technical and safety aspects*. Geneva, World Health Organization, 1982 (Offset Publication, No. 64).
14. *Norplant contraceptive subdermal implants. Managerial and technical guidelines (provisional version)*. Geneva, World Health Organization, 1989 (unpublished document WHO/MCH/89.17; available on request from Maternal and Child Health, World Health Organization, Geneva, Switzerland).

15. *Female sterilization: a guide to the provision of services*. Geneva, World Health Organization, in press.
16. *Technical and managerial guidelines for vasectomy services*. Geneva, World Health Organization, 1988.
17. *Induced abortion: guidelines for the provision of care and services*. Geneva, World Health Organization, 1979 (Offset Publication, No. 49).
18. Facts about an implantable contraceptive: memorandum from a WHO meeting. *Bulletin of the World Health Organization*, 63: 485-494 (1985).
19. KLECZKOWSKI, B. M. ET AL., ed. *Approaches to planning and design of health care facilities in developing areas, volume 5*. Geneva, World Health Organization, 1985 (Offset Publication, No. 91).
20. WHO Technical Report Series, No. 796, 1990 (*The use of essential drugs: fourth report of the WHO Expert Committee*).
21. HERZ, B. & MEASHAM, A. R. *The safe motherhood initiative: proposals for action*. Washington, DC, The World Bank, 1987.

Annex I

Technical Working Group on Essential Obstetric Functions at First Referral Level

Geneva, 23–27 June 1986

Participants

- Dr I. Aitken, Postgraduate Coordinator, Faculty of Community Medicine, University of Papua New Guinea, Boroko, Papua New Guinea
- Dr K. Bhasker Rao, Consultant Obstetrician and Gynaecologist, Madras, India
- Dr M. Fathalla, Dean, School of Medicine, Assiut University, Assiut, Egypt
- Dr K. A. Harrison, Professor of Obstetrics and Gynaecology, University of Port Harcourt, Port Harcourt, Nigeria
- Dr B. E. Kwast, Lecturer in Community Obstetrics, University of Addis Ababa, Ethiopia
- Dr P. Severyns, Senior Technical Adviser, United Nations Fund for Population Activities, New York, USA

Secretariat (WHO, Geneva, Switzerland)

- Dr R. Cook, Senior Medical Officer, Division of Family Health
(*Secretary*)
- Dr M. Belsey, Chief, Maternal and Child Health
- Dr R. Guidotti, Medical Officer, Maternal and Child Health
- Dr J. Kierski, Medical Officer, Maternal and Child Health

Annex 2

Surgical and delivery equipment

The instruments and equipment listed below are considered the minimum required for a maternity centre at first referral level, which may have to function under severe economic constraints. The lists are similar to, but not identical with, those given in Cook, J. et al., ed. *Surgery at the district hospital: obstetrics, gynaecology, orthopaedics, and traumatology* (Geneva, World Health Organization, 1991).

A. Obstetric laparotomy instruments

	Quantity
Stainless steel instrument tray with cover, 31 × 20 × 6 cm	1
Towel clips (Backhaus box lock)	6
Sponge forceps, 22.5 cm	6
Straight artery forceps, 16 cm	4
Uterine haemostasis forceps (Green-Armytage), 20 cm	8
Hysterectomy forceps, straight (Péan), 22.5 cm	4
Mosquito forceps, 12.5 cm	6
Tissue forceps (Allis), 19 cm	6
Uterine tenaculum forceps, 28 cm	1
Needle holder, straight (Mayo), 17.5 cm	1
Surgical knife handle	
No. 3	1
No. 4	1
Surgical knife blades	10 packets
Triangular point suture needles, 7.3 cm, size 6	2 packets
Round-bodied needles No. 12, size 6,	2 packets
Abdominal retractor (Deaver), size 3, 2.5 × 22.5 cm	1
Abdominal retractors, double-ended (Richardson)	2
Curved operating scissors, blunt pointed (Mayo), 17 cm	1

	<i>Quantity</i>
Abdominal self-retaining retractor (Balfour) with 3 blades	1
Straight operating scissors, blunt pointed (Mayo), 17 cm	1
Scissors, straight, 23 cm	1
Suction nozzle	1
Suction tube, 22.5 cm, 23 French gauge	1
Intestinal clamps, curved (Dry), 22.5 cm	2
Intestinal clamps, straight, 22.5 cm	2
Dressing (non-toothed tissue) forceps 15 cm	2
25 cm	1

B. Laparotomy dressings, linen and other items

	<i>Quantity</i>
Sterile gloves, sizes 6½, 7, 7½	12 pairs of each
Bundles of abdominal swabs with tapes (6 in each bundle)	3
Vulval pads	2
Dressing towels	6
Trolley towels	4
Abdominal sheets	2
Mackintoshes large	2
small	1
Bundles of radiopaque gauze (6 in each bundle)	3
Operating gowns, face masks and caps	3
Plain gauze and cotton-wool swabs	
Lithotomy set (for combined procedure)	1
Silk sutures in strands (each strand 0.5 m long)	6
Sutures, No. 1, 0 and 2/0 chromic catgut and 2/0 plain catgut, ties and with needles	
Cannulas for intravenous infusion	
Drainage tubes and corrugated drains	

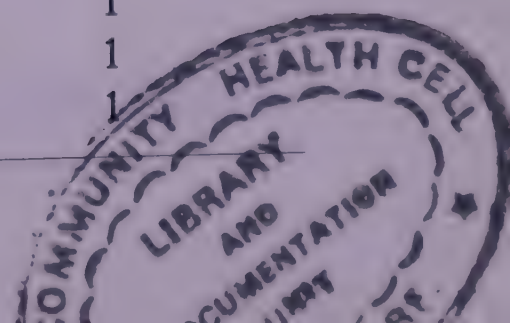
C. Instruments for vacuum extraction or forceps delivery

(including instruments for episiotomy and repair*)

	<i>Quantity</i>
Vacuum extractor (Malmstrom)	1
Obstetric outlet forceps (Wrigley)	1
Obstetric forceps, midcavity (Neville Barnes)	1
Obstetric forceps, breech delivery (Piper)	1
*Sponge forceps	4
*Artery forceps (Spencer Wells)	
large	2
small	2
*Needle holder	1
*Stitch scissors	1
*Episiotomy scissors	1
*Dissecting forceps, toothed	1
*Dissecting forceps, non-toothed	1
Urethral catheter, rubber or latex	1
Urethral catheters (Foley)	
gauges 12-21	1 of each
Towel clips	4
Vaginal speculum, large (Sims)	1
Vaginal speculum (Hamilton Bailey)	1
Kidney dish	1
Gallipot	1

D. Embryotomy/craniotomy set

	<i>Quantity</i>
Obstetric forceps (Neville Barnes)	1
Decapitation hook	1
Breech hook	1
Craniotomy bone forceps (Morris)	4
Cranial perforator (Simpson)	1
Embryotomy scissors	1
Episiotomy scissors	1
Stitch scissors	1
Sponge forceps	1
Dissecting forceps, toothed	1



	<i>Quantity</i>
Dissecting forceps, non-toothed	1
Artery forceps (Spencer Wells)	
large	2
small	2
Scalp forceps (Willet)	4
Vulsellum forceps	
large	4
small	1
Urethral catheter, latex	1
Needle holder	1
Vaginal speculum	1
Vaginal speculum, large (Sims)	1
Towel clips	4

E. Instruments for evacuation of uterus¹

	<i>Quantity</i>
Sponge forceps	4
Vaginal speculum, large (Sims)	1
Self-retaining vaginal retractor (Auvard)	1
Vulsellum forceps (Teale)	2
Uterine sound (Simpson)	1
Uterine dilators, double-ended (Hegar), set of 6	1
Uterine curettes	
blunt	2
sharp	2
Artery forceps, small (Spencer Wells)	1
Dissecting forceps	1
Ovum forceps (de Lee)	1
Vacuum aspirator	1

¹ Similar kit available from UNICEF: UNIPAC 9950010 (1990) Dilation and Curettage and Aspiration Kit.

F. Kit for insertion of intrauterine contraceptive device¹

	<i>Quantity</i>
Metal sterilization tray, with cover	1
Bivalve speculum	
small	1
medium	1
large	1
Sponge forceps	1
Long straight artery forceps	1
Uterine sound	1
Torch with batteries, or other suitable light source	1
Scissors	1
Antiseptic solution, aqueous iodine 1 in 2500	
Benzalkonium chloride 1 in 75	
IUD	
IUD inserter	
Sterile gloves	
Vulsellum forceps	
Dressing forceps	
Metal bowl	
Vulval pads	

G. Mini-laparotomy kit²

	<i>Quantity</i>
Tissue forceps (Allis), 19 cm	1
Towel clips (Backhaus)	4
Syringe, anaesthetic (control), 10 ml	1
Hypodermic syringes, 10 ml	4
20-gauge hypodermic needles, 4 cm	12
Dressing forceps, 14 cm	1
Tissue forceps, standard, 14 cm	1
Mosquito forceps, curved, 13 cm	6
Artery forceps, straight, 15.5 cm	3
Tissue forceps (Babcock), 19.5 cm	2
Artery forceps, curved, 20 cm	1

¹ Similar kit available from UNICEF: UNIPAC 9950025 (1990).

² This list was compiled by UNICEF in collaboration with UNFPA and WHO. Similar kit available from UNICEF: UNIPAC 9950050 (1990) Tubal ligation kit—abdominal.

	<i>Quantity</i>
Dressing forceps, 25 cm	1
Surgical knife handle, No. 4	1
Surgical blades, size 10	8
Needle holder (Mayo), 17.5 cm	1
Straight triangular point suture needles, 5.5 cm	2
Taper point needles (Mayo), size 6	12
Urethral catheters (French gauge)	
size 14	1
size 16	1
size 18	1
Tenaculum forceps	1
Uterine elevator (Ramathibodi)	1
Tubal hook (Ramathibodi)	1
Proctoscope	1
Stainless steel sponge bowl	1
Retractors (Richardson-Eastman)	2
Abdominal retractor	1
Vaginal speculum, medium (Graves)	1
Suture scissors	1
Operating scissors, straight, 15 cm	1
Scissors, curved, 17.5 cm	2
Instrument pan with lock lid	1

H. Vasectomy kit¹

	<i>Quantity</i>
Instrument tray, covered, 22.5 × 12.5 × 5 cm	1
Towel clips (Backhaus)	4
Forceps, haemostatic	
straight, 14 cm	4
curved, 12.5 cm	2
Tissue forceps (Allis), 15 cm	2
Surgical knife handle, No. 3	1
Surgical blades, size 10	10 packets
Hypodermic needles, 22-gauge	1 box
Hypodermic needles (Luer), 25-gauge	1 box
Needles, suture, straight	2 packets
Needles, suture, for catgut (Mayo) ½ circle	2

¹ Similar kit available from UNICEF: UNIPAC 9950075 (1990).

Quantity

Scissors, suture, angled on flat, 14 cm	1
Syringe, anaesthetic (control) (Luer), 5 ml	1
Syringes, hypodermic, 5 ml	4
Sterilizer, instrument, 20 × 10 × 6 cm	1
Forceps (Cheate), 26.5 cm	1

I. Equipment for neonatal resuscitation*Quantity*

Mucus catheter (sterile), rubber, open-ended, 15 French gauge	1 or more
Nasal catheter (sterile), rubber, open-ended, 8 French gauge	1
Endotracheal tubes, sterile, 12 French gauge	3
Curved stylet, sterile (for stiffening endotracheal tube when intubation is difficult)	1
Suction catheters, sterile, 6 French gauge	3
Infant laryngoscope (Magill), with spare bulb and batteries	1
Ventilatory bag	1
Oxygen cylinder, either with 40-cm water mano- meter and flowmeter or with safety valve and rubber bag (simple resuscitator)	1
Infant face masks	2
Airways	3
Umbilical vein catheters, sterile	3
Heat source	1
Thermometer, low-reading	2
Mouth suction device (Delee)	2

J. Equipment for anaesthesia¹

Anaesthetic face	2 of each size (infant to large adult); total
masks	14

¹ Dobson, M. B. *Anaesthesia at the district hospital*. Geneva, World Health Organization, 1988.

Oropharyngeal airways	2 of each size 00 to 5; total 12
Laryngoscopes	2 handles + 3 pairs of blades, or 2 adult + 2 paediatric plastic laryngoscopes 12 spare bulbs + 30 batteries (or 8 rechargeable batteries + charger)
Endotracheal tubes	sizes 2.5–10 mm (internal diameter) in 0.5 mm steps, Oxford or Magill or similar, with cuffs only on sizes over 6 mm
Urethral bougies	for use as intubating stylets
Intubating forceps (Magill)	in an emergency, ovum forceps can be used instead
Endotracheal tube connectors	15 mm plastic (can be connected directly to the breathing valve), 3 for each tube size
Catheter mounts (sometimes also called endotracheal tube connectors)	antistatic rubber, 4
Breathing hose and connectors	2 lengths of 1 metre antistatic tubing 4 lengths of 30 cm for connection of vaporizers T-piece for oxygen enrichment
Breathing valves	universal non-rebreathing valves (6 adult + 2 paediatric)
Breathing systems (for continuous-flow anaesthesia)	T-piece system (Ayre) breathing system (Magill)
Self-inflating bellows or bag	1 for adults + 1 for children

Anaesthetic vaporizers (draw-over type)	for ether, halothane and trichloroethylene
Equipment for intravenous use	needles and cannulas, including paediatric sizes and an umbilical vein catheter infusion sets
Spinal needles	range of sizes, 18-gauge to 25-gauge
Suction apparatus	foot-operated or electrically operated

Annex 3

Materials for side-ward laboratory tests and blood transfusion¹

Side-ward laboratory

<i>Test</i>	<i>Materials</i>	<i>Quantity</i>
Preparation and staining of thin blood films	Microscope	
	Immersion oil	
	Clean glass slides	
	Glass rods	2
	Sink or staining tank	1
	Measuring cylinder, 50 ml	1
	Wash bottle containing buffered water	1
	Interval timer clock	1
	Rack for drying slides	1
Thick blood film for malaria parasites	Leishman stain, methanol	
	Field stains A and B	
	Glass containers	4
	Microscope slides	
	Blood lancets	
Total and differential leukocyte count	Cotton wool	
	Counting chamber (Neubauer)	
	Pipette, 0.05 ml	
	Pipette, graduated, 1 ml	
	Türk diluting solution	
Estimation of haemoglobin	Tally counter, differential if possible	
	Haemoglobinometer	
	Blood lancets	

¹ For further details, see *Manual of basic techniques for a health laboratory*. Geneva, World Health Organization, 1980. Where appropriate, sterile venepuncture equipment must also be available.

<i>Test</i>	<i>Materials</i>	<i>Quantity</i>
Erythrocyte volume fraction (haematocrit)	Microhaematocrit centrifuge (manual or electric) Scale for reading results Heparinized capillary tubes, 75 mm × 1.5 mm Spirit lamp Blood lancets Ethanol	1 2 1
Detection of glucose in urine	Indicator papers and tablets or, if not available, Benedict solution Pipette Pyrex test-tubes Test-tube holder Beaker Spirit lamp	
Detection of ketones in urine	Indicator papers and tablets or, if not available, Test-tubes Rack Measuring cylinder, 10 ml Dropping pipette Sodium nitroprusside Glacial acetic acid Ammonia	
Detection of protein in urine	Indicator paper or tablets or, if not available, Test-tubes Pipette, 5 ml Sulfosalicylic acid, 300 g/l aqueous solution	
Detection of bile pigments in urine	Test-tubes Rack Measuring cylinder, 10 ml Dropping pipette Lugol iodine solution	

<i>Test</i>	<i>Materials</i>
Detection of urobilinogen in urine	Indicator paper and tablets or, if not available, Test-tubes Ehrlich reagent

Essential materials for the provision of donor blood for transfusion

Cross-matching

Patient's serum
 Patient's red cells
 Donor's red cells from pilot bottle
 8.5 g/l sodium chloride solution
 20% bovine albumin
 37 °C water bath or incubator
 Centrifuge
 Pipettes
 Test-tubes, small and medium

Collection of blood

Cotton wool and ethanol
 Sphygmomanometer cuff
 Airway needle for collecting bottle
 Blood collecting set containing 120 ml of acid–citrate–glucose solution
 An object for donor to squeeze
 Artery forceps
 Scissors
 Adhesive tapes
 Pilot bottle containing 1 ml of acid–citrate–glucose solution attached to the collecting bottle

A refrigerator (temperature 4–6 °C) is needed for storage of donor blood. A domestic refrigerator operated on either gas or electricity can be used, but the refrigerator must not be opened too often. A refrigerator that opens at the top is preferable to a cabinet refrigerator. *Note:* A kerosene-operated refrigerator is not suitable for blood storage.

Annex 4

Essential drugs for obstetric services¹

Anaesthetics, oxygen, muscle relaxants and preoperative medication

Atropine
Diazepam
Ether
Lidocaine
Nitrous oxide
Oxygen
Suxamethonium
Thiopental

Analgesics

Acetylsalicylic acid
Morphine
Paracetamol
Pethidine

Antiallergics

Epinephrine
Hydrocortisone
Promethazine

Antianaemia drugs

Ferrous sulfate
Folic acid
Iron dextran

¹ Appropriate dosage forms must be available but are not given here.

Anticoagulant and antidote

Heparin

Protamine sulfate (as antidote to heparin)

Antidiabetic agents

Insulin

Tolbutamide

Antihypertensive and other cardiovascular drugs

Hydralazine

Digoxin

Propranolol

Anti-infective drugs/antibiotics

Ampicillin

Benzylopenicillin

Procaine benzylopenicillin

Chloramphenicol

Gentamicin

Metronidazole

Sulfamethoxazole + trimethoprim

Tetracycline

Antimalarial drugs

Chloroquine

Proguanil

Pyrimethamine + sulfadoxine

Quinine

Blood products

Dried human plasma

Disinfectants and antiseptics

Chlorhexidine

Iodine

Surgical spirit

Diuretics

Furosemide

Intravenous solutions

Water for injection

Compound solution of sodium lactate

Glucose 5%, 50%

Glucose with sodium chloride

Potassium chloride

Sodium chloride

Sodium bicarbonate

Oral contraceptives

Ethinylestradiol + levonorgestrel

Ethinylestradiol + norethisterone

Depot medroxyprogesterone acetate

Norethisterone

Norethisterone enantate

Oxytocics

Ergometrine

Oxytocin

Psychotherapeutic drugs

Diazepam

Sera and immunoglobulins

Anti-D immunoglobulin (human))

Tetanus antitoxin (antitetanus immunoglobulin (human))

Tetanus toxoid

Annex 5

Maternity centre facilities and equipment

The facilities and equipment listed here would be suitable for a maternity centre in a catchment area of 100 000 people, with an expected 4000 deliveries a year.

Since outpatient facilities and equipment are commonly shared in hospitals between general outpatients and various specialties, the requirements for space, equipment and supplies for outpatients are not included in this annex.

Space requirements

Maternity ward

Three, 8-bedded rooms + 3 toilets per room
Treatment room
Equipment store
Bathrooms
Nurses' bay and station
Shower rooms
Sluice room
Room for cleaners/domestic staff
Staff cloakroom + 2 toilets
Pantry/ward kitchen
Corridor space
Trolley bay

Labour/delivery suite

Labour/delivery room (for 6–8 beds)
Eclampsia room (optional)
Sluice room
Nurses' bay
Admission/examination and preparation room
Side-room laboratory

Cleaners' room
 Store for consumable items
 Store for non-consumable items
 Toilets
 Shower room
 Waiting area for relatives
 Recovery room (for 4–6 beds)

Operating suite

Sterilizing room with store
 Main operating room
 Staff changing rooms (2), male and female
 Trolley bay
 Shower rooms (2), male and female
 Toilets (2), male and female
 Scrub-up post
 Anaesthetic rooms
 Office
 Recovery room

Items of furniture and equipment

Maternity ward

8-Bedded ward

Beds	8
Chairs	8
Bedside lockers	8
Overbed tables (optional)	8
Wash-basins	2
Mobile screens	3
Air-conditioner or fans (optional)	
Toilets	3

Beds should be standardized—a convenient size is 200 × 100 cm. Spring beds, initially comfortable, sag in the middle later. For this reason, the preference is for hoop iron mesh riveted to frames; such beds ventilate well and do not sag with age. The mattress should be about 10 cm thick.

Treatment room

Cupboard unit and work top	
Wall cupboards	3
Shelves, hooks	
Examination couch	1
Stool	1
Trolley	1
Bins	2
Paper-towel dispenser or equivalent	1
Wash-basin with elbow-operated taps	1
Autoclave or sterilizer (optional)	1
Stands for intravenous fluid drips	4
Sphygmomanometers + binaural stethoscopes	4
	of each
Thermometers	
Suction machine	1

Bathroom

Freestanding bath	1
Chair	1
Handrail	1
Hooks for clothes and towels	

Shower room

Same as bathroom, except that shower replaces bath.

Sluice room

Bedpan drier	1
Bedpan washer	1
Bedpan sterilizer	1
Ventilated cupboard for specimens	1
Storage for specimen-testing equipment	
Working surface	
Small sink	1
Wash-basin	1

Nurses' station

Table	1
Chairs	4

Trolley for patients' records	1
Storage for stationery	
Wall cupboards	2
Refrigerator	1
Notice board	1
Cabinet	1
Bookcase	1
Wash-basin	1

Nurses' bay

Office table	1
Chairs	2
Dwarf wall (can be used as work-top)	
Clock	1

Room for cleaners and domestic staff

Cleaning sink, domestic sink, draining board, locker, storage for brushes and brooms, bins, duster rack, cupboard for cleaning materials.

Staff cloakroom and toilets

Toilets	2
Wash-basins	2
Bins	2
Mirrors	2
Toilet-paper racks	2
Clothes hooks	3
Lockers	

Pantry or ward kitchen

Water boiler	1
Boiling plate	1
Refrigerator	1
Cupboard for crockery and cutlery	1
Cupboard for snacks and beverages	1
Sink	1
Draining board	1

Working surface	1
Bins	2

Equipment store

Shelves, racks, hooks

Labour delivery suite**Admission room**

Examination couch	1
Wash-basin	1
Scrub-up units with elbow-operated taps	2
Bin	1
Towels/paper towels	
Stands for intravenous fluid drips	3
Writing table	1
Chairs	2
Cupboard unit with work-top	1
Wall cupboards	3
Trolleys	2
Fetal stethoscope	1
Thermometer	1
Sphygmomanometer + binaural stethoscope	1
	of each

Nurses' bay

Office table	1
Chairs	3
Dwarf wall (can be used as work-top)	
Storage for stationery	
Wall cupboard	1
Notice board	1
Cabinet	1
Bookcase	1
Wash-basin (optional)	1
Small refrigerator	1

Labour/delivery room

Delivery beds with rods and stirrups for lithotomy position	8
---	---

Surgeon's stools	8
Wash-basins with elbow-operated taps	2
Trolleys	8
Cupboards for storage of sterile packs for various forms of vaginal delivery	2
Bins	8
Wall clock with seconds hand	1
Thermometers	8
Sphygmomanometers + binaural stethoscopes	4
	of each
Fetal stethoscopes	8
Mobile adjustable angled lamps	3
Neonatal resuscitation trolley or shelf	1
Oxygen cylinders	
Cupboard for resuscitation equipment	1
Air-conditioner or fan (optional)	1
Suction machine (if not available in separate eclampsia room)	1
Eclampsia room (optional)	
Same as for one-bedded delivery room with these additions:	
Side railings for delivery bed	1
Suction machine	1
Sterilizing facility	
Small autoclave or sterilizer (in labour room or other area)	1
Shower room, cleaners' room, sluice room	
As described for maternity ward.	
Side-ward laboratory	
Laboratory sink	1
Wash-basin	1
Laboratory bench with writing space	1
Cupboards for reagents (see Annex 2)	
Refrigerator (if needed for storage of blood and cross-matching requirements)	1

Store for consumables

Shelves, racks, cupboards

Store for non-consumables

Shelves, racks, hooks

Operating suite**Main operating theatre**

Operating table	1
Operating stools	2
Ceiling-mounted shadowless lamp, with 5 lamps or bulbs	1
Pedestal-mounted shadowless lamp, run off storage batteries in emergencies	1
Trolleys for instruments	3
Stands for intravenous fluid drips	2
Air-conditioners (optional)	2
Cupboards, shelves, drums for linen	
Diathermy apparatus	1
Swab rack	1
Containers for used swabs and instruments	
Suction apparatus	1
Sterilizer (35 × 38 cm, 139 litre), fuel-operated	1
Sterilizer drum (20 × 10 × 6 cm)	1
Kerosene stove	1
Forceps (Cheatle) 26.5 cm	1
Sterilizer forceps 20 cm	1
Neonatal resuscitation trolley (optional)	1

The operating table must be sufficiently sturdy to support the heaviest patient, and yet be movable, easy to tilt into the head-down position and easy to clean, and permit a patient to be placed in the lithotomy position. The trolley for surgical instruments is best made of stainless steel, with flat surfaces and no guard railings. The recommended shelves and cupboards are for storage of packs of sterile, autoclaved surgical instruments, wrapped individually and made into sets designed for particular operations. One set of cupboards should be located near where the anaesthetic team is customarily stationed.

Sterilizing room and store

Small autoclaves, cupboards and shelves for sterile store, large tables for sorting and packaging, drums, and changing and toilet facilities.

The instruments to be autoclaved should have first been cleaned in their respective wards. The same applies to linen, which should be laundered before being sterilized. On the whole, in a district hospital setting small-capacity autoclaves are preferable. They take a shorter time to run than large-capacity autoclaves, and are therefore less damaging to soft items like linen and dressings. For this reason, it is more efficient to use a small autoclave several times a day than to use a large machine once daily. Proper maintenance of autoclaves is imperative.

Staff changing rooms

Lockers	2
Mirrors	2
Wash-basins	2
Towels	
Shelves for clean gowns (scrub suits), masks and caps	
Row of hooks	
Mackintoshes	10
Large laundry baskets for used gowns (scrub suits)	
Shower rooms (2), male and female	
Toilets (2), male and female	

Trolley bay

Scrub-up post

Sink units with elbow-operated taps	2
Soap	
Bowls containing antiseptic solution	
Scrub-up hand brushes	

Anaesthetic room

Sink and drainer	1
Work-top	1
Cupboard for storage of drugs and instruments	2

Writing table or shelf	1
Trolley	1
Stool	1
Anaesthetic gases	
Anaesthetic machines (EMO draw-over type)	2

Recovery room

Trolley(s)	
Sphygmomanometer	1
Stethoscopes	2

Office

Writing desk with cupboards underneath	1
Chairs	3
Low table	1
Notice board	1
Crockery and cutlery for light refreshments	
Small refrigerator	1

SELECTED WHO PUBLICATIONS OF RELATED INTEREST

	<i>Price*</i> (Sw. fr.)
Royston, E. & Armstrong, S. Preventing maternal deaths. 1989 (233 pages)	40.-
Maternal care for the reduction of perinatal and neonatal mortality. A Joint WHO/UNICEF statement. 1986 (22 pages)	3.-
Cook, J. et al., ed. Surgery at the district hospital: obstetrics, gynaecology, orthopaedics, and traumatology. 1991 (207 pages)	25.-
Protecting, promoting and supporting breast-feeding: the special role of maternity services. A Joint WHO/UNICEF statement. 1989 (iv + 32 pages)	6.-
Rifkin, S.B. Community participation in maternal and child health/family planning programmes: an analysis based on case study materials. 1990 (ix + 38 pages)	9.50
Management development in maternal and child health and family planning programmes: proceedings of an intercountry workshop. SEARO Technical Publications, No. 11, 1988 (vii + 118 pages)	6.-
Technical and managerial guidelines for vasectomy services. 1988 (x + 125 pages)	22.-
Kleczkowski, B.M. et al., ed. Approaches to planning and design of health care facilities in developing areas, volume 5. WHO Offset Publication, No. 91, 1985 (106 pages)	11.-

Further information on these and other World Health Organization publications can be obtained from Distribution and Sales, World Health Organization, 1211 Geneva 27, Switzerland.

*Prices in developing countries are 70% of those listed here.

Maternal mortality rates in many developing countries remain unacceptably high. Rates in the poorest parts of the world can be 100 times as high as in some developed countries. Much can be done at the primary health care level, but most of these deaths are due to major complications of pregnancy requiring for their treatment the skills and facilities that should be available at the first referral level — the district or subdistrict hospital or health centre. This book defines the essential elements of obstetric care at first referral level, and is intended for those responsible for the planning, organization, and management of maternity care services, particularly in developing countries.

The first part of the book discusses the major causes of maternal mortality requiring medical or surgical intervention, including ectopic pregnancy, antepartum haemorrhage, and cephalopelvic disproportion. The indications and level of skill and facilities required for a wide range of procedures, such as caesarean section and the treatment of sepsis, are also described. Practical details of surgical and medical supplies and facilities are contained in the annexes, which list the minimum equipment necessary to perform the procedures mentioned, as well as essential drugs and side-ward laboratory equipment for basic biochemical tests.

The guidelines provided should be of assistance to all those who have a role to play in raising the standards of obstetric referral services in order to reduce maternal mortality and morbidity by bringing competent obstetric care within the reach of all who need it.